

PATENT COOPERATION TREATY

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INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY
(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 76)

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14 JAN 2005

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| Applicant's or agent's file reference 9441wo/cf | FOR FURTHER ACTION See Form PCT/IPEA/416 | |
| International application No. PCT/SE2003/001200 | International filing date (day/month/year) 11-07-2003 | Priority date (day/month/year) 16-07-2002 |
| International Patent Classification (IPC) or national classification and IPC B25J 19/00, H02G 11/00 | | |
| Applicant ABB AB et al | | |

1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 6 sheets, including this cover sheet.
3. This report is also accompanied by ANNEXES, comprising:
- a. ☒ (sent to the applicant and to the International Bureau) a total of 2 sheets, as follows:
- ☐ sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).
- ☐ sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.
- b. ☐ (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) _____, containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).

4. This report contains indications relating to the following items:

- | | | |
|-------------------------------------|--------------|---|
| <input checked="" type="checkbox"/> | Box No. I | Basis of the report |
| <input type="checkbox"/> | Box No. II | Priority |
| <input type="checkbox"/> | Box No. III | Non-establishment of opinion with regard to novelty, inventive step and industrial applicability |
| <input type="checkbox"/> | Box No. IV | Lack of unity of invention |
| <input checked="" type="checkbox"/> | Box No. V | Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement |
| <input type="checkbox"/> | Box No. VI | Certain documents cited |
| <input type="checkbox"/> | Box No. VII | Certain defects in the international application |
| <input checked="" type="checkbox"/> | Box No. VIII | Certain observations on the international application |

| | |
|---|---|
| Date of submission of the demand 06-02-2004 | Date of completion of this report 12-10-2004 |
| Name and mailing address of the IPEA/SE Patent- och registreringsverket Box 5055 S-102 42 STOCKHOLM Facsimile No. +46 8 667 72 88 | Authorized officer Ender Dag /itw Telephone No. +46 8 782 25 00 |

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.

PCT/SE2003/001200

Box No. I Basis of the report

1. With regard to the language, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.

- ☐ This report is based on a translation from the original language into the following language _____, which is the language of a translation furnished for the purposes of:
- ☐ international search (under Rules 12.3 and 23.1(b))
 - ☐ publication of the international application (under Rule 12.4)
 - ☐ international preliminary examination (under Rules 55.2 and/or 55.3)

2. With regard to the elements of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:

- ☐ the international application as originally filed/furnished
- ☒ the description:
- pages 1-9 _____ as originally filed/furnished
- pages* _____ received by this Authority on _____
- pages* _____ received by this Authority on _____
- ☒ the claims:
- pages _____ as originally filed/furnished
- pages* _____ as amended (together with any statement) under Article 19
- pages* 1-2 _____ received by this Authority on 2004-07-14
- pages* _____ received by this Authority on _____
- ☒ the drawings:
- pages 1-3 _____ as originally filed/furnished
- pages* _____ received by this Authority on _____
- pages* _____ received by this Authority on _____
- ☐ a sequence listing and/or any related table(s) – see Supplemental Box Relating to Sequence Listing.

3. ☐ The amendments have resulted in the cancellation of:

- ☐ the description, pages _____
- ☐ the claims, Nos. _____
- ☐ the drawings, sheets/figs _____
- ☐ the sequence listing (*specify*): _____
- ☐ any table(s) related to the sequence listing (*specify*): _____

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

- ☐ the description, pages _____
- ☐ the claims, Nos. _____
- ☐ the drawings, sheets/figs _____
- ☐ the sequence listing (*specify*): _____
- ☐ any table(s) related to the sequence listing (*specify*): _____

* If item 4 applies, some or all of those sheets may be marked "superseded."

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.

PCT/SE2003/001200

Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

| | | | |
|-------------------------------|--------|------------|-----|
| Novelty (N) | Claims | <u>1-8</u> | YES |
| | Claims | | NO |
| Inventive step (IS) | Claims | <u>1-8</u> | YES |
| | Claims | | NO |
| Industrial applicability (IA) | Claims | <u>1-8</u> | YES |
| | Claims | | NO |

2. Citations and explanations (Rule 70.7)

Documents cited in the International Search Report

D1: EP 0502832 A1
D2: JP 63180493 A
D3: JP 2000078736 A

The applicant describes that there are problems with prior art cable connections between two parts of a robot, as they use cables that have to be guided through the device. Disassembly then becomes complicated and time consuming. A robot also often has to work in small or confined spaces, and housing a coil of cable and a cable-guiding device inside requires a relatively large amount of space, which is only available to a limited extent. The present invention intends to solve these problems.

Document D1 shows a cable connecting two rotating parts of a robot. The cable extends from the first part to the second part through an external cavity (5). A cable is prevented from being twisted when a body rotates.

D2 shows a wiring structure of a robot. The cable extends through a cavity and is connected to a part with a contact (18).

Document D3 shows wiring between rotating joints in a robot. The cable is guided through a cavity in the first joint to a cavity (5) in the second joint, where the cable is turned spirally around an axis of a rotating part. The spiral part is attached to the cavity (5) and is freely guided to the other side of the cavity (5).

.../...

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.
Continuation of: BOX V

D1 represents the closest prior art document. The difference between D1 and the claimed invention, according to claims 1 and 8, is that the claimed invention provides an excess of cable extending freely through the internal cavity from the connection between the first and the second parts, which move relative to each other during operation. This excess of cable is wired inside the internal cavity to take up tension or slack in the cable caused by the movement of the parts. The cable is connected to at least one of the parts via a releasable contact point that is located inside the internal cavity. This provides a cable connection that is capable of accommodating cable length changes caused by the movements of one or both of the movable parts with a minimum space requirement.

The problem to be solved is to provide a contact point for the cable inside the internal cavity. The problem of having to guide the cable for a long distance in the robot is solved. D2 respectively D3 shows a wiring structure between rotating joints in a robot. The cable extends through a cavity and is freely guided to the other side of the cavity.

The problem to be solved in D2 respectively D3 does not address the same problem to be solved in the claimed invention. D2 describes the possibility for the cable to be connected to a part with a contact. D3 describes the possibility for the cable to turn spirally around an axis of a rotating part. However, D2 or D3 does not reveal an excess of cable which extends freely through the internal cavity and that at least one cable is connected to at least one of the movable parts via a releasable contact point located in the cavity.

The problem of the claimed invention is to allow rapid and simple assembly and disassembly to facilitate the replacement or maintenance of at least part of the cable.

Hence it is not obvious for a person skilled in the art to modify D1 with the help of D2 or D3 to solve the same problem as referred to in the claimed invention.

The invention according to claims 1-8 is thus novel and is

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INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.

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Supplemental Box

In case the space in any of the preceding boxes is not sufficient.

Continuation of: BOX V

considered to involve an inventive step. The invention also has industrial applicability.

Box No. VIII Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

The reference in claim 2 relates to "any preceding claims". The reference is inconsistent to the referred and dependent claim. Therefore, the reference should be adjusted to the statement which it refers to, "according to claim 1".

The reference for which claims 5 and 6 is referred and dependent to is incorrect. The protection for the matter of the interpretation of the invention, in order to achieve the claimed invention, is related to "claims 1-4". Therefore, the statement of technical features of the invention should be changed to this.

The matter for which claim 7 is sought for shall be in the terms of technical features of the invention. As far as the interpretation of the invention, in order to achieve the claimed invention, the claim should be referred and dependent to claim 6. Therefore, it should be changed to this.

CLAIMS

1. Industrial robot having a first part (7) and a second part (5) that are arranged to be movable with respect to each other where at least one cable (11) extends from the first part (7) to the second part (5) via an internal cavity (12), **characterized** in that an excess of cable extends freely through the internal cavity (12) from the first part (7) to the second part (5) and that said at least one cable is connected to at least one of the parts via a releasable contact point (10) that is located inside the internal cavity (12).
2. Industrial robot according any preceding claims, **characterized** in that one of said parts rotates or pivots about the other part.
3. Industrial robot according to any preceding claims, **characterized** in that one of the parts comprises an electric motor (8).
4. Industrial robot according to any preceding claims, **characterized** in that said excess of cable (11) forms an arch inside the internal cavity (12).
5. Industrial robot according to any of claims 1-6, **characterized** in that said excess of cable (11) forms a spiral inside the internal cavity (12).
6. Industrial robot according to any of claims 1-6, **characterized** in that said excess of cable (11) forms an S-shape inside the internal cavity (12).
7. Industrial robot according to claim 9, **characterized** in that the excess of cable (11) extends along an inner wall of the internal cavity (12).
8. Method of connecting at least part of at least one cable (11) between a first (7) part and a second part (5) of an industrial robot which are arranged to be movable with respect to each other where said at least one cable (11) extends from a first contact/securing point (10) on the first part (7) to a second contact/securing point

AMENDED SHEET

on the second part (5) via an internal cavity (12), characterized in connecting/securing said at least one cable to the first contact/securing point (10), moving the first and second contact/securing points into a position where they are furthest from each other, extending a length of cable (11) freely through the internal cavity (12) from the first contact/securing point (10) to the second contact/securing point (13) and connecting/securing said at least one cable releasably to the second part (5).